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Effect of columnar defects on the vortex-solid melting transition in Bi2Sr2CaCu2O8

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Abstract

The first-order phase transition of the vortex-lattice in Bi2Sr2CaCu2O8 crystals is shown to transform into a continuous transition when disorder is introduced via a very low concentration of columnar defects. We demonstrate fine tuning of the disorder strength and the recovery of the first-order transition by varying the concentration of the columns, by changing the temperature along the melting line, or by tilting the magnetic field with respect to the columns.